* NOTICES *

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the surface light source component which makes electroluminescence the luminescence light source.
[0002]
[Description of the Prior Art] The light source of the shape of a field which irradiates light from these rear faces is required for the transparency mold display device represented by the liquid crystal panel and the panel for an advertisement. The thing using electroluminescence (electroluminescence is hereafter abbreviated to "EL".) as one of the light sources of the shape of such a field is mentioned.
[0003]
[Problem(s) to be Solved by the Invention] In recent years, the request which is going to thin-shape-ize a transparency mold display device, the panel for an advertisement, etc. is strong. EL light source is thin, and if EL light source is used, thin shape-ization of a transparency mold display device etc. can be attained. However, the technical problem that brightness is low exists in EL light source.
[0004] This invention was made in view of the above-mentioned technical problem, uses EL for the light source, and though it is a thin shape, it aims at offering the surface light source component which has the description of being high brightness.
[0005]
[Means for Solving the Problem] The surface light source component of this invention which solves the above-mentioned technical problem Two or more heights are prepared in the light source which makes electroluminescence the source of luminescence, this light source, and the field which counters. It has the outgoing radiation light control strip arranged at the outgoing radiation side side of this light source so that these heights may stick to the outgoing radiation side of this light source, and it is characterized by taking out the beam of light which carried out incidence to the crowning of these heights the include angle beyond a critical angle from a light source side to an outgoing radiation light control strip side by these heights. The light source of the above-mentioned outgoing radiation light control strip and the field which counters may prepare two or more heights also in the field of the opposite side.
[0006] The light which carried out incidence of the luminous layer of EL to the wrap transparence base material among the light which emitted the luminous layer of EL light source above the critical angle causes total reflection, and outgoing radiation is not carried out from this transparence base material. In this invention, since two or more heights prepared in the optical plane of incidence of an outgoing radiation light control strip are stuck to the outgoing radiation side of EL light source, the light which carries out incidence above a critical angle can be taken out from the crowning of these heights. A surface light source component can be made to form into high brightness by this (the brightness to the direction of a transverse plane is improved about 50% at the maximum).
[0007]
[Embodiment of the Invention] The principle of this invention is explained using drawing 1 and drawing 2 . Drawing 2 is the outline sectional view of the light source (EL light source 1) which makes a

luminescence principle the general electroluminescence which consisted of the transparent electrodes 3, the electroluminescence layers 4, and the metal layers 5 which are represented by the transparence substrate 2 represented by clear glass etc., ITO, etc. Drawing 1 (a) is the outline sectional view of the surface light source component of this invention where the outgoing radiation light control strip 6 was formed in the optical outgoing radiation side side of the above-mentioned transparence substrate 2 of EL light source. Two or more heights 9 are formed in the field 7 which counters the transparence substrate 2 of an outgoing radiation light control strip, i.e., the optical plane of incidence of an outgoing radiation light control strip. These heights 9 stick with the outgoing radiation side of the transparence substrate 2 of the EL light source 1, and are unified. The light produced from the luminous layer 4 of the EL light source 1 shown in drawing 1 (a) and drawing 2 spreads the inside of the transparence substrate 2, and reaches an optical outgoing radiation side. When the refractive index of the transparence substrate 2 is made to n and an outgoing radiation side is made into air, a critical angle is thetac=Sin -1 (1/n).
It can come out (however, the refractive index of air is set to 1.). In the light which reached the interface of the transparence substrate 2 and air, when the incident angle to the transparence substrate 2 is smaller than a critical angle, outgoing radiation is refracted and carried out by the interface of the transparence substrate 2 and air (beam of light L1 shown in drawing 2). The light which carried out incidence at the bigger include angle than a critical angle spreads the inside of the transparence substrate 2 again by total reflection. Although this reflected light is again reflected by the interface of the EL luminous layer 4 and a metal electrode 5, when the surface layer of a metal electrode 5 is parallel to the front face of a transparence substrate, a multiple echo is repeated by the front face of the transparence substrate 2, and the surface layer of a metal electrode 5, and outgoing radiation is not carried out from the transparence substrate 2 (beam of light L2 shown in drawing 2).
[0008] However, the light in the conditions of total reflection can also be incorporated in the outgoing radiation light control strip 6 by sticking the crowning of the heights 9 prepared in the front face of the transparence substrate 2 by this invention at the optical plane-of-incidence side of the outgoing radiation light control strip 6 as shown in drawing 1 (a). In response to the total reflection in the heights wall surface of an outgoing radiation light control strip, or a refraction operation, outgoing radiation of this incorporated light is carried out from the optical outgoing radiation side 8 of the outgoing radiation light control strip 6. By the outgoing radiation light control strip, the light which was not used until now can be taken out and the brightness of a surface light source component can be raised. Drawing 1 (b) is the outline perspective view of an example of the surface light source component of this invention shown in drawing 1 (a).
[0009] Although two or more above-mentioned heights prepared in an outgoing radiation light control strip in this invention do not need to have periodicity,-dimensional [1] or two-dimensional periodic structure may be made. When two or more above-mentioned heights prepared in an outgoing radiation light control strip have periodicity, it is desirable for the rate of the height of the heights to the period (pitch) of heights to be in the range of 1/3 to 2. It is because EL outgoing radiation light from other than the adhesion section of heights may be refracted by these heights when refraction on a heights wall surface and reflection may stop being able to happen easily when it becomes smaller than this range, and it becomes larger than this range. Moreover, as for this period, it is desirable that it is in the range of 5cm from 10 micrometers. An example of the pattern of the heights which have the periodicity prepared in drawing 3 at the optical plane of incidence of an outgoing radiation light control strip is shown. When drawing 3 (b) of drawing 3 (a) in the case of a two-dimensional pattern is a 1-dimensional pattern, an example is shown, respectively. When these heights are 1-dimensional patterns, the angular distribution of only the direction which intersects perpendicularly to the direction of a slot of heights can be controlled, but when these heights are two-dimensional patterns, it is possible to control the angular distribution of both directions.
[0010] When preparing the heights of a 1-dimensional pattern in the field (outgoing radiation side) of the opposite side, as for both the field which counters the light source of an outgoing radiation light control strip, and the field concerned, it is desirable to be prepared in the direction in which the heights of this 1-dimensional pattern intersect perpendicularly mutually. It not only takes out the light from EL

light source, but by preparing heights also in the outgoing radiation side concerned, it can give the function which controls angular distribution of the outgoing radiation light from a surface light source component to an outgoing radiation light control strip. High brightness-ization is attained with constituting so that the heights prepared in the outgoing radiation side side of this outgoing radiation light control strip may make a prism array.

[0011] The cross-section configuration of this heights pattern may consist of any of a straight line and a curve. When it consists of curves, it is desirable to be constituted combining a parabola, ellipses, or these curves. An example of the heights cross-section configuration by the side of the plane of incidence of the outgoing radiation light control strip used for drawing 4 by this invention is shown. What is shown in drawing 4 (a) is constituted in a straight line. What is shown in drawing 4 (b) consists of curved surfaces, and the curved surface has become ellipse-like. The curved surface which is not restricted in the shape of an ellipse and consists of combination of a paraboloid, and an ellipse and a paraboloid is sufficient as a curved surface. In addition, it is possible to turn the peak of brightness in the direction of slant to the outgoing radiation side of a surface light source component by changing the configuration of heights prepared in a configuration [which is prepared in the plane-of-incidence side of an outgoing radiation light control strip / of heights], and outgoing radiation side side.

[0012] The outline perspective view of other examples of the surface light source component of this invention is shown in drawing 5 . With this surface light source component, heights 10 are formed also in the outgoing radiation side side of the outgoing radiation light control strip 6. As this outgoing radiation light control strip 6 is shown in drawing 6 , the heights 9 of a 1-dimensional pattern are formed in the incidence side (light source side), and the heights 10 of a 1-dimensional pattern are formed also in the outgoing radiation side. The direction of a slot of these two heights lies at right angles mutually. Since the cross-section configuration of the heights 10 by the side of the above-mentioned outgoing radiation can be made to condense further by the heights 10 in which the light condensed by considering as the prism array whose vertical angle is 90 degrees by the heights 9 by the side of incidence was prepared at the outgoing radiation side, high brightness-ization can be attained more.

[0013] The outline perspective view of other examples of the surface light source component of this invention is shown in drawing 7 . With this surface light source component, the very small heights 10 are arranged at random at the outgoing radiation side side of the outgoing radiation light control strip 6. The height of these very small heights is distributed at random in 0.1 to 3 micrometers. in the case of this example, the light condensed by the heights 9 by the side of plane of incidence was prepared in the outgoing radiation side side -- this -- you can make it scattered about by the random heights 10, angular distribution of brightness can be made gently-sloping, and improvement in appearance can be aimed at. moreover -- the case where the grid prepared in the plane-of-incidence side has periodicity -- this -- since the periodic pattern of a grid can be hidden according to the scattering effect by the very small heights 10, the moire generated when the liquid crystal panel which has this surface light source component and periodicity is combined can be prevented.

[0014] The above-mentioned heights of the outgoing radiation light control strip used by this invention are produced by carrying out press forming of the acrylic board. Moreover, ultraviolet-rays hardening resin is applied on the film which has the transparency of a TAC film, an acrylic film, a PET film, PC film, etc., and after stiffening ultraviolet-rays hardening resin by pushing female metal mold against this and irradiating ultraviolet rays (UV), it is producible also by exfoliating a moldings from female metal mold. An outgoing radiation light control strip is producible also by carrying out injection molding using transparence resin. The above-mentioned heights of an outgoing radiation light control strip and the transparence substrate of EL light source can be pasted up using the adhesives of a (ultraviolet-rays UV) hardening mold.

[0015] Organic and inorganic any are sufficient as the ingredient which forms the electroluminescence layer of EL light source used as the light source in this invention. Moreover, since this invention tends to take out the light shut up in EL light source by the total reflection which happens within EL light source covered with the transparence substrate by the heights in which it was prepared at the optical plane-of-incidence side of an outgoing radiation light control strip, it can be used regardless of the configuration

of EL light source.
[0016] As an application of the surface light source component of this invention, the back light for liquid crystal, the back light for an advertisement, indoor lighting, an indicator, etc. are mentioned.
[0017]
[Effect of the Invention] this invention -- high -- a brightness electroluminescence mold face light source component can be obtained.

[Translation done.]

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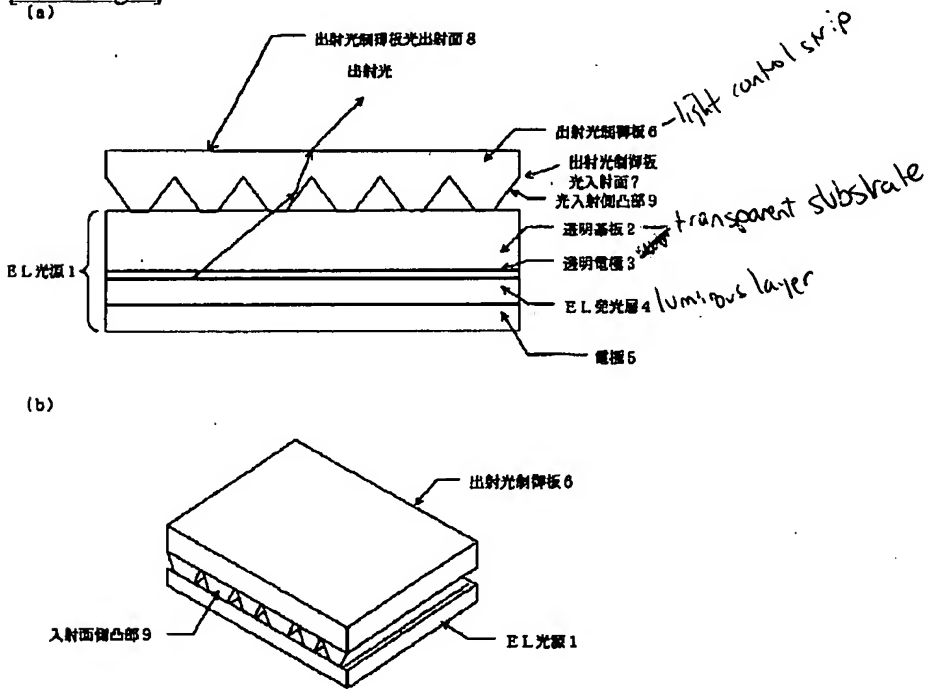
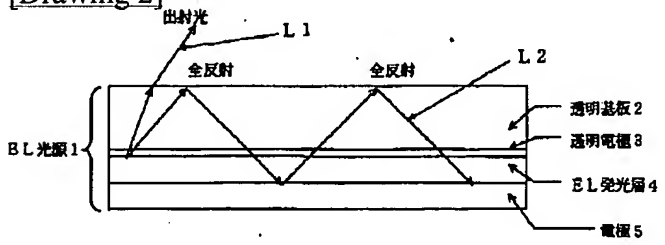
DRAWINGS

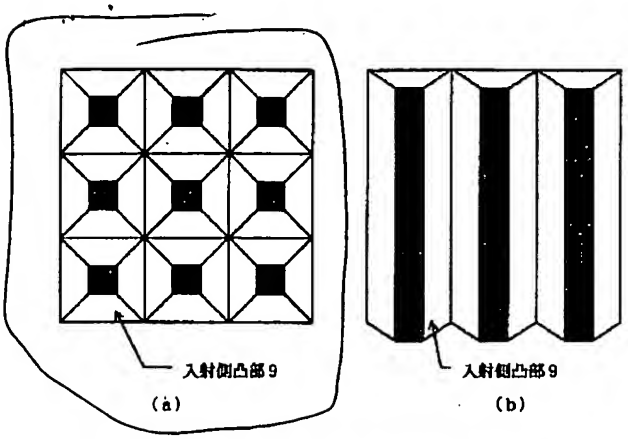
[Drawing 1]



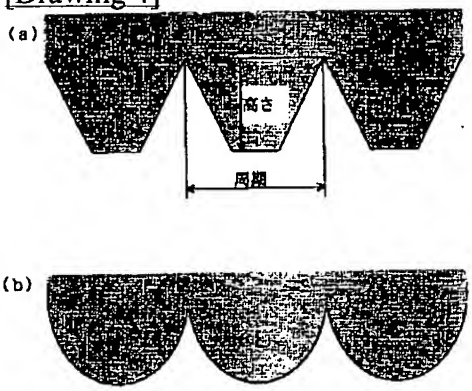
[Drawing 2]



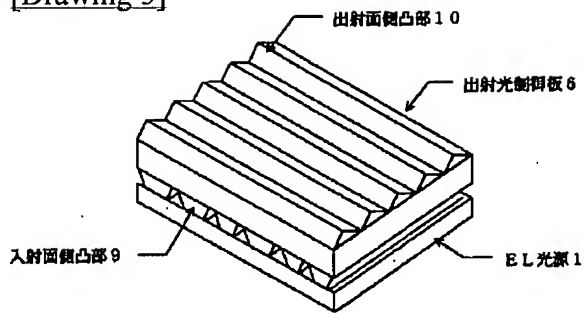
[Drawing 3]



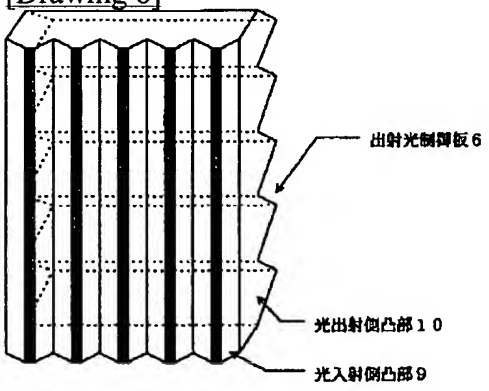
[Drawing 4]



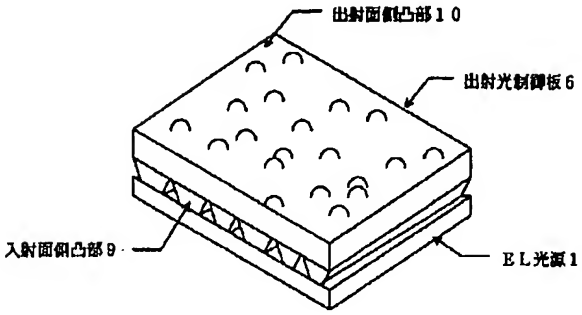
[Drawing 5]



[Drawing 6]



[Drawing 7]



[Translation done.]